We have a powerful potential in our youth, and we must have the courage to change old ideas and practices so that we may direct their power toward good ends.
Mary McLeod Bethune (1875–1955)
Founder, National Council of Negro Women

ENVIRONMENTAL DISEASE

Saving the Lives of Children Under 5

Save the Children has compiled the first ever league table ranking 60 developing nations in their efforts to preserve the lives of their youngest citizens. This information, published in the May 2007 report *State of the World's Mothers 2007: Saving the Lives of Children Under 5*, illustrates how even the poorest countries can implement effective solutions to prevent untimely child deaths.

The table comprises UNICEF data for all countries with at least 50,000 child deaths per year or a rate of 90 deaths per 1,000 live births in 2004, and reflects changes in under-5 mortality since 1990. The 60 countries included were home to 75% of the world's children under age 5 years in that year, and were where 94% of all under-5 deaths occurred.

Some countries have made remarkable progress in reducing the number of under-5 deaths. Egypt, for example, achieved a massive 68% reduction, Indonesia 60%, and Bangladesh, Nepal, and the Philippines each around 50%. Thirty-five other countries also have seen improvements. However, 20 countries, including 18 in sub-Saharan Africa, have either seen no improvement or suffered increases. Iraq saw the worst decline in the world—under-5 mortality increased by 150% as a result of the deprivations imposed by civil unrest, sanctions, and war.

"The figures show much progress has been made [in many countries], but there is still much to do," explains David Oot, associate vice president of health at Save the Children. Oot says that if certain simple, low-cost solutions were made available to all children—ensuring that a skilled person attended all deliveries, exclusive breastfeeding for the first 6 months of life, immunization against measles, use of oral rehydration solution for diarrhea sufferers, and low-cost treatment of common infections such as pneumonia and malaria—more than 6 million more lives could be saved every year. These solutions improve survival by targeting the major causes of child mortality.

Skilled assistance at birth increases both infant and mother survival.

He highlights that success is possible even under difficult circumstances: "Several countries with combinations of weak health services, political unrest, and low incomes have made significant progress. Nepal, for example, clearly shows what can be achieved when the political will is there and basic, cost-effective interventions are implemented at scale." Despite an average per-capita income of just US$1,530 and years of civil unrest, Nepal has increased child vaccination coverage from 43% to 83%, has trained community health workers and parents to treat pneumonia and diarrhea at home, is now training the same community health workers to administer antibiotics to treat sepsis in newborns, and is educating women on contraception to reduce unwanted and high-risk pregnancies.

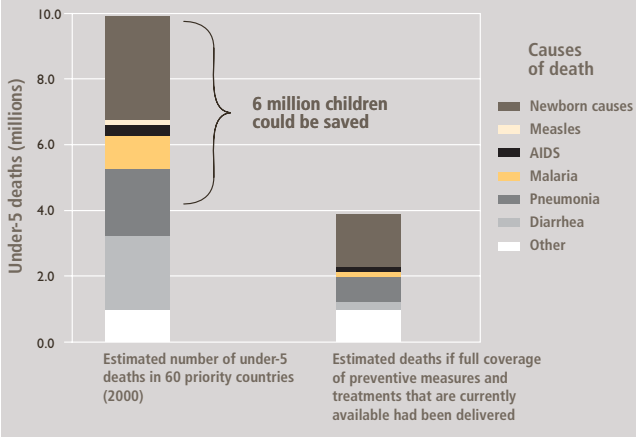
The report breaks down the rank listing for each country into the percentages of the under-5 population presently covered by the above low-cost solutions—data that could provide NGOs and government authorities with a way to focus their actions where they can be most beneficial.

However, says William Moss, an associate professor of epidemiology at the Johns Hopkins Bloomberg School of Public Health, although the five recommended solutions are essential to improving child survival, they can not prevent all child deaths. Moss says, "These strategies are drawn from a larger list of cost-effective preventive and treatment interventions that must be delivered as an integrated package"

A spokesman for Oxfam UK also noted that some countries may be unable to absorb all the available aid centered on these solutions, for example due to a lack of civil servants to oversee its distribution. Further, some countries face special threats, such as HIV/AIDS, against which these solutions would make little impact.

Although the list provides a starting point for understanding why some countries have been successful in reducing child mortality, Moss cautions that alone it may not provide sufficient information to fully guide future decision making. "A more detailed analysis might identify interventions, programs, and health system characteristics in those countries that substantially reduced child mortality, which could guide child survival strategies in countries with similar epidemiological profiles," he concludes.
–Adrian Burton

Potential Averted Deaths in Children Under 5



Source: Save the Children. 2007. State of the world's mothers 2007: saving the lives of children under 5. Westport, CT: Save the Children; 12.

Eileen Burke

Chemical Exposures

The Sweet Scent on Baby's Breath?

Synthetic fragrances known as polycyclic musks are added to soap, shampoo, deodorant, cleaning agents, cosmetics, and other consumer products. Now they are also turning up in human breast milk. In the first U.S. study to measure polycyclic musks in breast milk, environmental toxicologist Kurunthachalam Kannan at the New York State Department of Health and colleagues found the highest levels ever recorded in nursing mothers.

Over the past 20 years, polycyclic and other synthetic musks have replaced expensive natural musks derived from endangered wildlife. The two most widely used polycyclic musks, HHCB and AHTN, make up 90% or more of the U.S. and European markets for these compounds. Synthetic musks are used to mask chemical odors in products labeled "unscented"—though they aren't added to products labeled "fragrance-free."

Kannan measured polycyclic musks in milk samples collected from 39 nursing women in Massachusetts. The average concentration of HHCB was five times higher than that measured in European breast milk samples 10 years ago, and the average AHTN concentration was twice that detected in another European study in 1999. Using these averages and the average consumption of breast milk, Kannan estimated that babies may ingest 1,830 ng of HHCB and 5656 ng of AHTN per day.

Kannan believes pregnant women should avoid products with musk fragrances because, he says, "Not much is known about the toxicity of these compounds to humans, let alone to babies." The findings are reported in the 1 June 2007 issue of *Environmental Science & Technology*.

Polycyclic musks are emerging pollutants, and little is known about their human or environmental health effects. Musk compounds in products like lotions can readily penetrate the skin. Inhaling airborne polycyclic musks (for example, from perfumes and air fresheners) offers another source of exposure. In an earlier study published in the November 2005 issue of *Chemosphere*, Kannan showed that polycyclic musks accumulate in human fat tissue at concentrations up to 1 ppm. Moreover, in the January 2005 issue of *EHP*, Till Luckenbach and David Epel showed that polycyclic musks blocked the activity of multidrug efflux transporters that pump toxicants from cells to protect them from damage. Inhibiting these pumps allows pollutants to enter cells and accumulate.

Manufacturers do not disclose the quantity of musk compounds added to consumer products yearly. Musk ingredients often are not listed on product labels, or they are called simply "fragrance" or by the trade names galaxolide (for HHCB) or tonalide (for AHTN). "Our everyday experience suggests that there are more fragrances in consumer products and at higher concentrations than ever before," says Keri Hornbuckle, a professor of environmental engineering at the University of Iowa.

Hornbuckle's group has measured polycyclic musks in surface water and outdoor air samples in rural and urban areas. "We find them everywhere," she says, "and their concentration is proportional to the population of the area where samples are collected." Concentrations of HHCB in Lake Erie doubled between 1990 and 1998, Hornbuckle reported in the 15 September 2006 issue of *Environmental Science & Technology*.

Hornbuckle also reported in the November 2006 *Archives of Environmental Contamination and Toxicology* that polycyclic musks reduce the growth of the juvenile and larval stages of the freshwater mussel *Lampsilis cardium*, a sentinel for vulnerable aquatic species in ecological systems. As scientists learn more about the impact of polycyclic musks on organisms and ecosystems, "we may become more concerned about exposure in humans," Hornbuckle says. **–Carol Potera**

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Cars, Kids, and Cigarettes Don't Mix

In August 2007 New York City councilman James Gennaro proposed a city ban on smoking in cars with passengers under the age of 18, following the example of similar measures in other parts of the United States and Australia. In July 2006, for example, the state of Arkansas imposed statewide restrictions on the habit. But unlike some other existing bans, Gennaro's calls for fines of up to $2,000 for noncompliance. A study published 18 July 2007 ahead of print in the *Journal of Exposure Science and Environmental Epidemiology* noted that just two cigarettes' worth of secondhand smoke exposes car passengers to particulates in excess of government safety standards.

Green School Movement

Green schools, with features such as natural lighting and low-emission building materials, generally see lower rates of asthma and allergies among students and staff, better student attendance, and higher teacher retention. Green schools typically are also cheaper to operate and consume less water and energy. In July 2007, the U.S. Conference of Mayors put the weight of its 1,100-plus constituents behind a resolution calling on Congress to fund K–12 green school demonstration projects and research to better identify the payoffs of building green schools. So far, more than 30 schools have received LEED certification, with 300 more in line to do so.

What Keeps Little Ones Up at Night

Studies in the July 2007 issue of *Early Human Development* and the September 2007 issue of *Pediatrics* have uncovered factors that may disrupt infant and toddler sleep. The first study identified a link between anxiety and depression

in pregnant women and sleep problems in their offspring that can negatively affect a wide range of bodily and developmental processes. The second study found that nicotine in breast milk produces similar effects and, the authors speculate, could further increase these children's risk of becoming smokers themselves, given that children often prefer flavors initially transmitted through breast milk.

NEUROLOGY

Secondhand Behavioral Problems

Children whose mothers regularly smoked during pregnancy are known to be more likely to exhibit disruptive and aggressive behavior than children of nonsmoking mothers. A new study now finds that children born even to nonsmoking mothers who were exposed to chronic secondhand smoke (SHS) while pregnant face serious problems of attention deficit/hyperactivity disorder (ADHD) and conduct disorder, which includes fighting, truancy, substance abuse, and stealing.

At the University of Washington, psychologists Lisa Gatzke-Kopp and Theodore Beauchaine recruited 171 children aged 7–15 years who had emotional and behavioral problems. Their mothers consisted of 21 women who smoked regularly during the second and/or third trimester, 16 nonsmokers who were exposed during the second and/or third trimester to SHS at work or home, and 96 women who neither smoked nor were exposed to SHS (some of the mothers had more than one child in the study).

More symptoms of ADHD and conduct disorder were measured in children of smoking or SHS-exposed mothers, compared with children of smoke-free mothers. In fact, severe symptom scores were about the same for children whether they were exposed *in utero* to maternal smoking or to SHS. Childhood emotional disorders such as depression and anxiety were not significantly associated with maternal smoking or SHS exposure during pregnancy.

ADHD and conduct disorder are "externalizing" behaviors, as opposed to "internalizing" outcomes such as depression and anxiety. Animal models show that nicotine impairs brain development during the second and third trimesters, the formative periods for brain regions that control externalizing behaviors, such as the mesolimbic dopamine system.

The study, published online 23 May 2007 ahead of print in *Child Psychiatry and Human Development*, is the first to link SHS exposure in pregnancy to serious disruptive behavior during childhood. However, the level of SHS exposure studied was "chronic and extreme and all day long," points out Gatzke-Kopp, now at Pennsylvania State University; therefore "pregnant women should not panic about minor exposures to secondhand smoke." Still, the researchers hope their results will raise awareness about the potential health consequences of SHS to pregnant women in public places and work environments that still permit smoking (such as restaurants and bars).

Lauren Wakschlag, an associate professor of psychology at the University of Illinois Institute for Juvenile Research, says the new study "highlights where we need to go to disentangle the complex relationship of prenatal secondhand smoke exposure and antisocial behavior." However, with only 16 SHS-exposed participants and 21 smokers, the central emphasis on SHS versus smoking needs to be interpreted cautiously. "These preliminary findings suggest a possibility that secondhand smoke affects behavior," says Wakschlag, "but we need more systematic exploration of this." **–Carol Potera**

DIET AND NUTRITION

You Are What Your Mother Ate

It is now axiomatic that the *in utero* environment influences prenatal development and may trigger structural and functional changes that can persist for a lifetime. New evidence of the importance of the womb environment for the long-term health of offspring was published in the June 2007 *Journal of Clinical Endocrinology and Metabolism*. The study's findings show for the first time in humans that the diet a mother consumes in late pregnancy can alter the stress response of her offspring, possibly setting the stage for greater susceptibility to cardiovascular problems and other forms of stress-related disease into adulthood.

The study builds on an investigation published in the August 2003 issue of the same journal in which scientists from the United Kingdom found that greater maternal meat and fish intake were linked with elevated fasting plasma cortisol concentrations in offspring. The adrenal glands secrete cortisol in response to chronic stress, and this can affect both vascular responses and the metabolism of glucose and lipids. Epidemiologic studies

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have established that chronic elevation of cortisol levels in children and young adults can raise the risk of later developing hypertension, diabetes, and heart disease.

That original study population was a group of mothers attending a maternity hospital in Motherwell, Scotland, between 1952 and 1976. These mothers had been advised to eat a high-meat, low-carbohydrate diet in an experimental attempt to prevent preeclampsia (hypertension during pregnancy). The advice was to eat 1 pound of red meat daily during pregnancy and to abstain from carbohydrate-rich foods such as bread and potatoes. Subsequent studies showed that the adult offspring of mothers with the highest recorded meat intakes went on to experience high cortisol and develop hypertension.

For the most recent study, researchers recruited 31 men and 39 women born in Motherwell during 1967 and 1968. Previous analyses of the data abstracted from obstetric records had shown a doubling of protein intake between early and late pregnancy in the mothers of these children. The 70 adult offspring were given a 5-minute public speaking task followed by a 3-minute mental arithmetic task. Salivary cortisol was measured before, during, and after the tasks. Cortisol levels were found to increase in tandem with the amount of meat and fish the study participants' mothers had consumed in late pregnancy. "Compared with offspring of mothers who had reported eating no more than 13 meat/fish portions per week, the average cortisol concentrations were raised by 22% and 46% . . . in offspring of those reporting 14–16 and at least 17 portions per week respectively," the researchers wrote. The effect seemed slightly greater in men than women.

In animal studies, high-protein diets have been shown to stimulate the HPA axis, a component of the endocrine system

ehpnet

Peace Child International

Peace Child International (PCI) works through affiliated groups in more than 100 countries to inspire young people to become more socially and environmentally conscious through education, leadership development, and community involvement. PCI works with the UN and its agencies to promote its mission and programs, described at http://www.peacechild.org/.

The PCI program "Be the Change" funds small community action projects developed and implemented primarily by people under age 25 in support of the eight UN Millennium Development Goals adopted in 2000. Recent projects have set up a bicycle taxi service in Kenya, launched a water and sanitation effort in Uganda, and organized an eco-library in Armenia.

PCI is currently compiling a children's book about environmentally friendly transportation around the world, which will be distributed to London primary schools. Draft spreads for the book and calls for contributions are available on the website. The site also offers issues of *TUNZA*, UNEP's quarterly magazine for young people, through its Resources section. Each issue focuses on themes such as green cities, recycling, and food and the environment, with numerous articles as well as a section where UNEP experts answer questions sent in by readers.

The site also hosts information on the biennial World Youth Congresses that PCI began organizing in the late 1990s. These conferences convene youth from around the world to recognize their work in furthering sustainable development practices as outlined in the Millennium Development Goals. The next congress is scheduled for Québec in August 2008. **–Erin E. Dooley**

that regulates cortisol and other stress-related hormones. "We are not certain of the mechanism, but postulate that an unbalanced diet in pregnancy may act as a stressor to the mother, increasing her production of cortisol and subsequently increasing cortisol production in the offspring," says lead author Rebecca Reynolds, an endocrinologist at Queen's Medical Research Institute in Edinburgh. In essence, by altering HPA axis activity and promoting high cortisol levels in the gestational environment, the high-protein diets appear to "reprogram" the developing fetal HPA axis.

Previous human studies related size at birth to adult plasma cortisol levels, but this is the first to examine the connection between gestational diet and stress adaptation in adult offspring. "This study adds to increasing evidence for the importance of the maternal diet," says coauthor Keith Godfrey, an epidemiologist at the University of Southampton. Reynolds and her team now plan to examine how the increased stress responses in the Motherwell offspring relate to subsequent disease.

The Motherwell mothers adhered to a diet pattern similar to low-carb/high-protein diets that have recently become popular for weight control. Such diets have been associated with an increased risk of kidney problems and metabolic ketoacidosis, another potential prenatal stressor. Ketoacidosis results when carbohydrate intake is restricted and the body turns to other energy sources, such as fat; acids known as ketones build up in the blood. One of the by-products of ketoacidosis is beta-hydroxybutyrate. When this compound is elevated during gestation, it can stunt behavioral and intellectual development in offspring.

"In pregnant women, even mild ketoacidosis is a very serious condition that has an adverse effect on fetal growth and development," says Natalia Igosheva, a research scientist at King's College London. "Diet-induced metabolic ketoacidosis represents a possible mechanism for the impact of an unbalanced maternal diet on the offspring's neurodevelopment."

Instead of low-carb/high-protein diets, Reynolds urges women of child-bearing age to strive for a balanced diet. This is supported by a recent study out of Spain, published in the February 2007 issue of *Clinical Endocrinology*, in which women who chose a dietary pattern closer to the Mediterranean diet (which emphasizes fruits, vegetables, nuts, olive oil, chicken, and seafood) showed lower levels of HPA axis disturbance. **–M. Nathaniel Mead**

Lag in Label Laws

A decade ago, the FDA admitted that its regulations regarding pharmaceutical labeling needed revision to help protect pregnant women against taking products that could harm their unborn children. Although a new labeling system has been developed, it is still not in place, and the agency says implementation could still be three years away. The Public Affairs Committee of the Teratology Society published a position paper in the September 2007 issue of *Birth Defects Research Part A* calling for these changes to be implemented without delay. The paper also recommends testing the system to assess its effectiveness in conveying levels of risk and improving clinical decision making.

Early Puberty Among U.S. Girls

The risk of breast cancer can increase by as much as 50% in women who reach menarche at age 12 compared with age 16. Other possible effects of early puberty include depression, anxiety, and eating and adjustment disorders. *The Falling Age of Puberty in U.S. Girls*, an August 2007 report published by the Breast Cancer Fund, reveals that U.S. girls are reaching puberty earlier, but the effect is greatest in overweight black girls. At age 10, three times as many black girls as white girls have begun menstruating. The onset of puberty can be affected by factors including obesity as well as pharmaceutical and other chemical exposures.

Sussing Out High Blood Pressure in Kids

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About 2 million U.S. children and adolescents are estimated to have high blood pressure, but 1.5 million of their cases may be undiagnosed, according to a study in the 22 August 2007 issue of *JAMA*. A review of more than 14,000 child medical records showed that only 26% of the children with high blood pressure as reflected in readings taken over three doctor visits had received such a diagnosis. It is not fully known how high blood pressure affects people in these age groups, although some experts speculate it may contribute to early artery and heart damage.

Iron Deficiency in Toddlers

UT Southwestern Medical Center researchers report in the September 2007 issue of *Pediatrics* that being overweight and not attending daycare both put toddlers at high risk for iron deficiency. Iron-deficiency anemia in the formative years is linked with behavioral and cognitive delays in such areas as mental and motor development, learning, and school achievement. Hispanic toddlers were more likely than white or black children to be overweight and not in daycare, factors the authors say should be considered when implementing community-based interventions.